

REMARKS

Claims 1-33 are pending in the subject application.

Applicants request reconsideration of the pending claims in light of the following remarks.

Rejection Under 35 U.S.C. § 102:

Claims 1, 5, 6, 11-17 and 22-33 were rejected under 35 U.S.C. § 102(b) as being anticipated by Foster et al (US 6,054,248; hereinafter Foster) for reasons recited from page 2 to page 9 of the Final Office Action (hereinafter Office Action). Applicants respectfully traverse this rejection on the following basis.

To anticipate a claim, a single source must contain all of the elements of the claim. Applicants submit that Foster does not disclose all of the elements of applicants' claims 1, 13, 24 and 29.

For instance, applicants submit that Foster does not disclose a polymer having an aromatic group and a methacrylate polymer as recited in claims 1 and 24 and a copolymer having a monomer with an aromatic group and a methacrylate monomer as recited in claims 13 and 29.

Instead, Foster, as stated in the Office Action, discloses thermally curable polymer composition that comprises *hydroxyl-containing polymers*, and suitable examples of the hydroxyl-containing polymers are polymers comprising monomers units selected from the group consisting of cyclohexanol, hydroxyl acrylate or methacrylate, hydroxycycloalkyl acrylate or methacrylate, hydroxyalkylcycloalkyl acrylate or methacrylate, allyl alcohol and the like (see, Office Action at page 2). In other words, Foster clearly does not disclose methacrylate monomer alone, instead, Foster discloses *hydroxy-containing* methacrylates. Accordingly, Foster does not disclose applicants' methacrylate without the hydroxyl group, as recited in claims 1, 13, 24 and 29.

It is contended in the Office Action that the thermally curable polymer composition may further comprise monomer units of cycloaliphatic esters of acrylic or methacrylic acid, and that suitable examples of monomer units of cycloaliphatic esters of acrylic or methacrylic acid include cyclohexyl acrylate or methacrylate, 4-tert-butylcyclohexyl acrylate or methacrylate, isobomyl acrylate or methacrylate and adamantly acrylate or methacrylate and the like (see, Office Action at page 3). However, Foster does not disclose a methacrylate monomer alone, but

instead, Foster discloses *cycloaliphatic esters* of methacrylates. Accordingly, Foster does not disclose applicants' polymer having an aromatic group and a methacrylate polymer in claims 1 and 24, and a copolymer having a monomer with an aromatic group and a methacrylate monomer in claims 13 and 29.

It is further contended in the Office Action that "the hydroxyl-containing polymer may further comprise aromatic monomer units, preferably styrene." (see, Office Action at page 3), and that "[o]ther preferred copolymers useful in the thermally curable polymer composition are a copolymer of styrene and allyl alcohol...; and a terpolymer of hydroxyalkyl acrylate or methacrylate, cycloaliphatic esters of acrylic or methacrylic acid and styrene...." (see, Office Action at page 3 bridging page 4). Again, applicants submit that the passage in Foster stating that "the hydroxyl-containing polymer may further comprise aromatic monomer units, preferably styrene" is distinguishable from applicants' claimed invention as recited in claims 1, 13, 24 and 29. The polymer in Foster clearly requires a hydroxyl-containing group in addition to an aromatic group. (see, Foster, col 5, polymer 3). Foster discloses a thermally curable polymer composition that is a copolymer of styrene and *allyl alcohol*. Further, the terpolymer in Foster has its monomers a *hydroxyalkyl* (meth)acrylate, a cycloaliphatic ester of (meth)acrylate and styrene. Therefore, Foster does not disclose applicants' claimed polymer having an aromatic group and a methacrylate polymer, as recited in claims 1 and 24, or a copolymer having a monomer with an aromatic group and a methacrylate monomer, as recited in claims 13 and 29.

The Office Action further contends three preferred polymers as being alleged anticipatory on the present claims, specifically, Polymer 1 which comprises isobomyl (meth)acrylate monomer units and 2-hydroxyethyl (meth)acrylate monomer units, Polymer 2 which comprises isomomyl (meth)acrylate monomer units and 2-hydroxyethyl (meth)acrylate monomer units and styrene monomer units, and Polymer 3 which comprises styrene monomer units and allyl alcohol monomer units. (see, Office Action at page 4 bridging page 5). The polymers in Foster all contain a hydroxyl group (i.e., 2-hydroxyethyl and allyl alcohol) in combination with a *substituted* meth(acrylate) group or aromatic group, and there is no disclosure in Foster for applicants' polymer having an aromatic group and a methacrylate polymer in claims 1 and 24 and a copolymer having a monomer with an aromatic group and a methacrylate monomer in claims 13 and 29.

Moreover, applicants submit that Foster does not disclose a method of irradiating a blended or prepared material coated on the substrate for curing the polymer composition to form the underlayer as in claims 1, 13, 24 and 29 of the present invention.

Instead, Foster teaches a thermally curable polymer composition in which it may be cured at a temperature of less than about 250°C and for a time less than about 180 seconds. Foster does not disclose irradiating the blended or prepared material.

For at least the above reasons, applicants respectfully submit that Foster does not anticipate applicants' claims 1, 13, 24 and 29. Because claims 5, 6, 11 and 12 depend on base claim 1 and claims 14-17, 22 and 23 depend on base claim 13, claims 25-28 depend on base claim 24, and claims 30-33 depend on claim 29, applicants respectfully submit that Foster also does not anticipate claims 5, 6, 11, 12, 14-17, 22-33.

Accordingly, applicants respectfully request the Examiner to reconsider and withdraw the rejection to claims 1, 5, 6, 11-17 and 22-33 under 35 U.S.C. § 102(b) as being anticipated by Foster.

Rejection Under 35 U.S.C. § 103:

Claims 2-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Foster in view of Schaedeli et al (US 6,146,793; hereinafter Schaedeli) for reasons recited at from page 9 to page 10 of the office action. Applicants respectfully traverse this rejection on the following basis.

As discussed above, Foster does not anticipate claim 1 of the present invention. Applicants submit that Schaedeli does not cure the deficiency in Foster to lead a person skilled in the art to come up with claims 2-4 of the present invention.

The prior art references or combination of references must teach or suggest all the limitations of the claims. Here, Foster in combination with Schaedeli does not teach or suggest all the limitation of the present claims. Foster discloses a thermally curable polymer composition comprising a hydroxyl-containing polymer. Foster does not disclose applicant's methods of forming an underlayer of a bi-layer resist film comprising forming a blended material by blending a *polymer having an aromatic group and a methacrylate polymer*, as in applicants' claim 1.

Schaedeli does not cure the deficiencies in Foster. Schaedeli teaches a terpolymer and a method of making it. The Office Action stated that Schaedeli teaches phenolic resin in the undercoat layer such as novolak resin (see, Office Action at top of page 10). Granted, one skilled in the art may use a phenolic resin similar to Schaedeli, but one skilled in the art would not be able to use Foster and Schaedeli in combination to come up with applicant's claims because the polymers in Foster and Schaedeli, either alone or in combination, do not teach or suggest applicants' claim 1. The combination of Foster and Schaedeli would instead lead a person skilled in the art to a polymer that comprises a *hydroxyl-containing* methacrylate group in a phenolic resin, which does not teach or suggest applicants' polymer having an aromatic group and a methacrylate polymer, as in applicants' claim 1. Accordingly, applicants submit that applicants' claim 1 is patentable over Foster in view of Schaedeli. Further, applicants submit that their claims 2-4, which are dependent on base claim 1, are also patentable over Foster in view of Schaedeli.

Accordingly, applicants respectfully request reconsideration and withdrawal of the rejection to claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over Foster in view of Schaedeli.

Claims 6-10 and 17-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Foster in view of Wong et al (US 6,319,655; hereinafter Wong) for reasons recited in page 10 of the office action. Applicants respectfully traverse this rejection on the following basis.

As discussed above, Foster does not disclose the present claims. Applicants submit that Wong also does not cure the deficiency in Foster to lead a person skilled in the art to come up with claims 6-10 and 17-21 of the present invention.

The prior art references or combination of references must teach or suggest all the limitations of the claims. Here, Foster in combination with Wong does not teach or suggest all the limitation of the present claims. Foster teaches a thermally curable polymer composition comprising a hydroxyl-containing polymer. Foster does not disclose a polymer composition that would teach or suggest applicants' polymer having an aromatic group and a methacrylate polymer in claim 1 and a copolymer having a monomer with an aromatic group and a methacrylate monomer in claim 13.

Wong does not cure the deficiencies in Foster. Wong teaches a process for producing an etch resistant image at a exposure dose of 193nm, and the polymer comprises an olefin, an acrylate, a methacrylate, a norbornene containing polymer, alicyclic polymer or combinations thereof. Wong does not teach or suggest applicants' polymer having an aromatic group and a methacrylate polymer in claim 1 and a copolymer having a monomer with an aromatic group and a methacrylate monomer in claim 13.

A person skilled in the art would not be able to come up with applicants' claims 6-10 and 17-21 from Foster and Wong.

First, both Foster and Wong do not teach or suggest applicant's polymer. Wong simply does not cure the deficiency in Foster, as Wong teaches a process for increasing the etch resistance of sensitive photoresist materials by electron beam exposure at 193nm, and not directed at the polymer itself other than that the polymer comprises various substituents as noted above. Since Foster is directed to a hydroxy-containing polymer, its combination with Wong also does not lead to applicants' polymer.

Also, one skilled in the art reading Wong would likely consider the exposure of 193 nm as the best region for producing an etch resistant image, not applicants' claimed range of from about 150 nm to about 180 nm, preferably about 172 nm as claimed in claims 7, 8, 19 and 19. Wong teaches irradiating the photoresist film with a high energy beam, e.g. 193nm, to generate acid (H⁺), which reacts with the polymer. Clearly, one reading Wong would be directed to a radiation exposure using high beam electron at 193 nm, not applicants' claims of UV rays having a wavelength of from about 150 nm to about 180 nm, preferably about 172 nm. For at least these reasons, applicants submit that claims 1 and 13 are patentable over Foster in view of Wong. Further, applicants submit that claims 6-10 and 17-21, which depend on base claims 1 and 13 respectively, are also patentable over Foster in view of Wong.

Accordingly, applicants respectfully request reconsideration and withdrawal of the rejection to claims 6-10 and 17-21 under 35 U.S.C. § 103(a) as being unpatentable over Foster in view of Wong.

Conclusion:

For the foregoing reasons, the present application, including claims 1-33, is believed to be in condition for allowance. The Examiner's early and favorable action is respectfully requested. The Examiner is invited to contact the undersigned if he has any questions or comments in this matter.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Bernard Lau", is written over a horizontal line.

Bernard Lau
Reg. No. 38,218
Attorney for Applicants

F. Chau & Associates, LLC
130 Woodbury Road
Woodbury, NY 11797
Tel: (516) 692-8888
Fax: (516) 692-8889